Analysis and categorization of Drug Related Problems in a Tertiary care teaching hospital-
A Prospective Observational Study

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Abstract:
Background: Drug related problems (DRPs) are associated with hospital admissions resulting in patient morbidity and mortality, and increased costs. Objectives: Present Prospective observational study aims to identify and characterize DRPs in the patients who were admitted in the General Medicine, Pediatrics and Surgery Departments in a tertiary care teaching hospital. Methodology: A specially designed proforma was used for patient data collection & the study was approved by institutional ethics committee. Inclusion criteria includes, patients who were hospitalized for more than three days and who were willing to give informed consent to participate in the study. Results: Among the 100 cases evaluated, an average of 46% cases were reported with the DRPs associated with safety problems, 28% cases were related to effectiveness and 26% cases were related to necessity. The average age was 33±5 years for the patient with DRPs. The mean of 4±2 co morbidities with 7±6 complaints were observed and an average of 4±2 medications per patient was prescribed. Conclusion: The clinical pharmacists and hospital pharmacists in co-ordination with the prescribers aid in the reduction of DRPs through manual or online prescription auditing and medication reconciliation programmes. Majority of the DRPs may be reduced through pharmacist’s intervention.

Key words:
Drug Related Problems (DRPs), Second consensus of Granada (2002), Prescription Auditing, Medication Reconciliation.

“1.Introduction”

The Brazilian Consensus of Pharmaceutical Care defines the pharmaceutical care as a conjunction of activities in which the pharmacist interacts directly with patients; between these activities are the dispensation, the health education, the pharmaceutical orientation, and the pharmacotherapeutic follow-up. [1]

To obtain a optimized patient outcomes in pharmacy practice, the pharmaceutical care should focus mainly on the identification, prevention, and resolution of drug-related problems (DRPs). Drugs play a dualistic therapeutic role[2]. With proper usage of drugs, they are intended to provide cure, prevent or diagnose the diseases. Whereas, improper usage of which, can lead to serious patient morbidity and mortality[3].

The drug-related problem is defined as “an undesirable patient experience that involves drug therapy and that actually or potentially interferes with a desired patient outcome”[4]. Drug-related morbidity should include, not only major adverse effects, but also any other undesirable effect occurring in patients [5.6]. A literature search showed that one out of 3 hospital admissions were caused by drug related problems[7].

Classification of drug related problems:
The various classification systems of drug related problems are as follows[8-11]:

- ABC system
- ASHP classification
- Cipolle et al.
- Granada consensus
- Hanlon
- Hepler/Strand
- Kriskaet al.
- Mackie
- PAS
- PCNE Classification
- PI-doc
- SHB-SEP
- Westerlund classification

Out of all these classification, drug related problems based on second consensus of Granada is found to satisfy the criteria that should be
considered in the selection of drug related problem classification[12]

“2. Objective”

The main objective of this present study is to identify and characterize drug related problems (DRPs) in the patients who were admitted in the General Medicine, Pediatrics and Surgery wards of a tertiary care hospital.

“3. Methodology”

The study has been conducted after approved by IEC and after getting informed consent form(both languages)

Study design:

The present study was designed as cross sectional prospective observational study.

Study population:

The study included 100 in-patients, prescribers, transcribers and nurses.

Study place:

The study was conducted in 3 departments including General Medicine, Pediatrics and Surgery departments of a Tertiary Care Teaching Hospital, Tirupati.

Study period:

The study was conducted for a period of three months from January, 2016 to March, 2016.

Data collection:

The data were collected using patient medication profile and from direct patient interview. Each patient’s medication profile was reviewed. The appropriateness of each drug prescribed was identified, addressing safety, effectiveness and necessity. Standards for drug therapy included any available current clinical guidelines.

Patients who were hospitalized more than 3 days and agreed to give informed consent were included in this study.

Exclusion criteria include patients administering their own drugs and injections in the unannounced control visit.

Figure 1- Age wise distribution of patients

The department wise distribution of the patients is as follows:

Table 1- Department wise distribution of patients

<table>
<thead>
<tr>
<th>Department</th>
<th>No. of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>General surgery</td>
<td>24</td>
</tr>
<tr>
<td>Paediatrics</td>
<td>29</td>
</tr>
<tr>
<td>General medicine</td>
<td>47</td>
</tr>
</tbody>
</table>

The patients were categorized based on the co-morbidities present to them. Maximum patients were found to have no co-morbidity.

Figure 2- No. of patients based on co-morbidities

The patients were categorized based on the number of drugs prescribed to them per prescription. Maximum number of patients was found to be prescribed with 4 to 6 drugs.
Table 2: Based on number of drugs prescribed per patient

<table>
<thead>
<tr>
<th>No. of drugs</th>
<th>No. of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 3</td>
<td>8</td>
</tr>
<tr>
<td>4 to 6</td>
<td>34</td>
</tr>
<tr>
<td>7 to 9</td>
<td>28</td>
</tr>
<tr>
<td>10 to 12</td>
<td>14</td>
</tr>
<tr>
<td>13 to 15</td>
<td>11</td>
</tr>
</tbody>
</table>

Categorization based on the length of hospital stay of the patient is as follows:

Table 3: Based on length of hospital stay

<table>
<thead>
<tr>
<th>Hospital stay</th>
<th>No. of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 1 week</td>
<td>76</td>
</tr>
<tr>
<td>1 to 2 weeks</td>
<td>15</td>
</tr>
<tr>
<td>2 to 3 weeks</td>
<td>4</td>
</tr>
<tr>
<td>3 to 4 weeks</td>
<td>2</td>
</tr>
<tr>
<td>above 4 weeks</td>
<td>3</td>
</tr>
</tbody>
</table>

The prescriptions of the 100 patients included in the study were analyzed for drug related problems and 52.7% of prescriptions were presented with 1137 DRPs. The persons involved in the medication errors include physician (prescriber), nurse (administrator) and the patients (consumer).

The frequency of DRPs based on second consensus of Granada is as follows:

Table 5: Drug interactions

<table>
<thead>
<tr>
<th>No. of drug interactions</th>
<th>No. of Prescriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 5</td>
<td>74%</td>
</tr>
<tr>
<td>6 to 10</td>
<td>16%</td>
</tr>
<tr>
<td>11 to 15</td>
<td>6%</td>
</tr>
<tr>
<td>Above 15</td>
<td>4%</td>
</tr>
</tbody>
</table>

Categorization of DRPs based on number of DRPs per prescription is as follows:

Table 6: Total DRPs

<table>
<thead>
<tr>
<th>No. of DRPs</th>
<th>Prescriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 5</td>
<td>55%</td>
</tr>
<tr>
<td>6 to 10</td>
<td>24%</td>
</tr>
<tr>
<td>11 to 15</td>
<td>13%</td>
</tr>
<tr>
<td>16 to 20</td>
<td>5%</td>
</tr>
<tr>
<td>above 21</td>
<td>3%</td>
</tr>
</tbody>
</table>

The number of adverse drug reactions based on number of patients is as follows:

Table 4: No. of ADRs

<table>
<thead>
<tr>
<th>No. of ADRs</th>
<th>No. of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>65</td>
</tr>
<tr>
<td>1</td>
<td>32</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

The drug interactions identified in the prescriptions are as follows:

Figure 3: Frequency of DRPs

The distribution of health problems, per category, presented by patients followed-up

“5. Discussion”

Hundred patients were analyzed, being the majority of them men (61.0%).

The maximum number of patients was found to be above 60 years of age. This may be because of chronic illness due to age related changes.

The average age was 33±5 years for the patient with DRPs. The mean age found was compatible with the results of other Pharmaceutical care services in the United States (58 years) (Leanne, 1998; Cipolle et al., 2004) [14].

Fifty eight patients out of hundred patients reported with one disease without any comorbidities present to them. The mean of 4±2 co morbidities were observed Study reported by Cipolle in 2004, reported an average of 3 ± 2 diseases in patients.
younger than 65 years, and 5 ± 2 diseases in those older than 65 years.
The mean of 746 complaints were observed. The obtained result is compatible with the report obtained from Yone de Almeida Nascimento conducted at 2009 with 7 ± 6 complaints. The major diseases diagnosed in these age groups include chronic illnesses like coronary artery disease, diabetes mellitus, arterialhypertension. The reports are consistent with the reports of study conducted Yone de Almeida Nascimento conducted at 2009. Majority of the drug related problems are due to safety problems(mainly drug interactions). Among the 100 cases evaluated, an average of 46% cases were reported with the DRPs associated with safety problems, 28% cases were related to effectiveness and 26% cases were related to necessity.Past study conducted in 2009 reports that the more frequent DRPs were related to effectiveness (53.2%), to necessity (25.2%) and to safety (21.6%).
The observed average of utilization was 4 ± 2 medications as per the study conducted by Yone de Almeida Nascimento at 2009. Whereas in this study, the average medications prescribed per patient is 4 ± 2.
Previous studies have suggested a need for a unified medication system to eliminate errors at the ordering and transcription stage. Medication chart should state the components -especially drug form and route. This study was conducted only for three months, focusing majorly on the major departments of the hospital.
Many of these problems could be resolved through proper pharmaceutical care to the patients. Apart from this, other measures like, the introduction of non-pharmacological measures, the implantation of strategies to increase the adhesion to pharmacologic and non-pharmacologic treatments, the education about the correct use of medications, the health education and the indication of OTC medications. More research, focusing on all the other departments, is needed in this field to reduce uncertainty and generate evidence based recommendations for physicians.

“6. Conclusion”

Everybody involved in the treatment process is responsible for their part of the process. It is important to detect medication related problems. In recent years, patient safety has become a major concern for health providers and medication management is one of its more relevant aspects.

The number of medical conditions and the number of medications prescribed showed significant positive correlation with the number of DRPs. Major risk factors for the DRPs are found to be polypharmacy and comorbidities.

Internal documentation of these activities by pharmacists is an essential activity of any hospital pharmacy department for program evaluation and justification of services.

DRPs can be preventable through effective systems control involving pharmacists, physicians, nurses and patients as well as regulatory agencies and the pharmaceutical industry.

“7. References”


12. Painel de consenso according to Segundo Consenso de Granada about Drug related problems. ARSPharmaceutica, 2002, 175


15. Yone de Almeida Nascimento et al., Drug-related problems observed in a pharmaceutical care service, Belo Horizonte, Brazil, Brazilian Journal of Pharmaceutical Sciences vol. 45, n. 2, abr./jun., 2009